NOT MEASUREMENT-SENSITIVE

K0000268843-GEN
REVISION BASIC

STATEMENT OF WORK (SOW)
DEVELOPMENT & TEST SITE
SINGLE WALL CRYOGENIC FLEX HOSE

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JUNE 16, 2015

ENGINEERING AND TECHNOLOGY DIRECTORATE

National Aeronautics and
Space Administration

John F. Kennedy Space Center

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STATEMENT OF WORK (SOW)
DEVELOPMENT & TEST SITE
SINGLE WALL CRYOGENIC FLEX HOSE

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JOHN F. KENNEDY SPACE CENTER, NASA

RECORD OF REVISIONS		
REV LTR	**DESCRIPTION**	**DATE**
-	Basic Issue	June 16, 2015

CONTENTS

DEVELOPMENT & TEST SITE SINGLE WALL PIPE SPOOL FABRICATION

1. SCOPE

This Statement of Work (SOW) defines the primary tasks to be performed by the Contractor for the fabrication, testing, and delivery of the Development & Test Site Single Wall Pipe Spools and denotes the requirements, terms, and conditions specified for this activity. The Contractor shall furnish all labor, equipment, materials, and services to schedule, coordinate, supervise, and provide quality control for fabrication, testing, and delivery of the Development & Test Site Single Wall Pipe Spools as defined by this SOW, associated engineering drawings, and referenced standards and specifications.

The Contractor shall fabricate the following part numbers to the requirements within the drawings and in accordance with this SOW:

Part No.	Serial No(s).	Program Model No.	Description	Qty.	Delivery Date (no later than)
K0000094324	001 002	n/a	**Flex Hose**	**2**	8/1/2015
K0000094325	001 002 003	n/a	**Flex Hose**	**3**	8/1/2015
K0000081554	001 002 003	n/a	**Flex Hose, 2nps**	**3**	8/1/2015
K0000081556	001 002 003	n/a	**Flex Hose, 2nps**	**3**	8/1/2015
K0000081557	001 002 003	n/a	**Flex Hose, 4nps**	**3**	8/1/2015
K0000081560	001 002 003 004 005	n/a	**Flex Hose, 4nps**	**5**	8/1/2015

2. APPLICABLE DOCUMENTS

The latest revision at the time of award of this Delivery Order (DO) of the documents listed below form a part of this specification to the extent specified herein.

2.1 Precedence

In the event of conflict between the referenced documents and the contents of this SOW, the order of precedence shall be as follows:

1. Engineering drawings (Appendix A)
2. This SOW
3. NASA documents (section 2.4)
4. KSC documents (section 2.4)
5. Other governmental documents (section 2.5)
6. Non-governmental documents (section 2.6)

2.2 Specifications, References and Documents

The Contractor shall be responsible for reviewing all of the drawings, specifications, and references; and for notifying the Contracting Officer of any concerns.

The Contractor shall be responsible for obtaining all standards, specifications, and documents identified below and or referenced in the drawings and specifications. These documents may be obtained as follows:

Any Military Standards required by the subcontractor can be obtained by writing to:

Military Standards
Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

If any of the documents invoked herein are changed during the period of performance of the Delivery Order, the Contractor shall not use the later issue without prior written approval of the Contracting Officer.

2.3 Engineering Drawings

All required engineering drawings are listed in Appendix A.

2.4 NASA and KSC Documents

The governmental standards and specifications as a whole supplies the resources to establish good engineering practices and procedures to ensure the safe and effective performance of operational and maintenance activities, and non-routine procedures.

Document Number	Title
76K04875	Stud Bolt, Type 316 SST
76K04876	Nut-Hex, Type 316 SST
76K04886	Gasket, Cryogenic, LH2 and LO2
KDP-KSC-P-2388	Processing Contractor Request for Use of Nonconforming Supplies or Services
KDP-F-5042 A-K	Acceptance Data Package Required Documents
KDP-P-5042	Engineering and Technology Directorate Acceptance Data Package Process Document
KSC-C-123	Surface Cleanliness Of Ground Support Equipment Fluid Systems, Specification For
KSC-SPEC-Z-0009	Lubrication, Thread, Corrosion-Resistant Steel and Aluminum Alloy Tube Fittings, Specification For
KSC-STD-E-0015	Marking of Ground Support Equipment Standard

2.5 Other Governmental Documents

Document Number	Title
FED-STD-595	Colors Used in Government Procurement
MIL-PRF-27401	Propellant, Pressurizing Agent, Nitrogen
MIL-PRF-27407	Propellant, Pressurizing Agent, Helium
MIL-STD-792	Identification Marking Requirements For Special Purpose Components

2.6 Non-Governmental Documents

Document Number	Title
ANSI/NCSL Z540.3	Requirements for the Calibrations of Measuring and Test Equipment
ASME B36.19M	Stainless Steel Pipe
ASME B31.3	Process Piping
ASME B16.5	Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24 Metric/Inch Standard
ASME B16.9	Factory-Made Wrought Buttwelding Fittings
ASME B16.21	Nonmetallic Flat Gaskets for Pipe Flanges

ASTM A182	Standard Specification for Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service
ASTM A240	Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
ASTM A312	Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes
ASTM A403	Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings
ASTM A580	Standard Specification for Stainless Steel Wire
ASTM A967	Standard Specification for Chemical Passivation Treatments for Stainless Steel Parts
ASTM G93	Standard Practice for Cleaning Methods and Cleanliness Levels for Material and Equipment Used in Oxygen-Enriched Environments
AWS D17.1	Specification for Fusion Welding for Aerospace Applications
CGA G-4.1	Cleaning Equipment For Oxygen Service
ISO 14952	Space Systems – Surface Cleanliness of Fluid Systems
MSS SP-6	Standard Finishes for Contact Faces of Pipe Flanges and Connecting-End Flanges of Valves and Fittings
SAE ARP 901	Bubble Point Test Method
SAE AS9100	Inspection and Test Quality System

3. SUBMITTALS AND COMMUNICATION

The Contractor shall provide all of the data, listed in Appendix C, of this Statement of Work entitled "Contract Data Requirements List (CDRL)". All contract data requirements shall be submitted to the Contracting Officer as identified in the Delivery Order unless otherwise specified. All CDRL items shall be subject to the unilateral approval of the Contracting Officer. In the event of disapproval, the Contractor shall initiate immediate corrective action and shall resubmit to the NASA Contracting Officer for approval within five working days.

3.1 Deliverables

The Contractor shall submit all data deliverables electronically. All documents shall be submitted in an electronic format that is searchable (e.g., PDF). For documents that were scanned, the Contractor shall run "paper capture" or optical character recognition to convert the file to a searchable format before submittal.

3.2 Acceptance Data Package (CDRL Item C1)

The Contractor shall develop, maintain, through the duration of the Delivery Order, and deliver, one for each deliverable part, an Acceptance Data Package (ADP). KDP-P-5042, Engineering and Technology Directorate Acceptance Data Package Process Document defines and specifies the minimum ADP requirements. The ADP shall contain all official correspondence between the Contractor and Contracting Officer, quality control documents, inspection and test records, and any other documentation required to administer the successful completion of the Delivery Order and all documentation as listed in Appendix C.

The Contractor shall complete all KDP-F-5042 documents provided by the Government and include them in ADP as specified in KDP-P-5042. The ADP shall be assembled in the order shown in KDP-F-5042B, ADP Index. Use form KDP-F-5042A, ADP Inventory Checklist, as an aid to assemble the ADP. The ADP shall include a cover page and a table of contents with each section linked to the cover page of that section, and shall be in text searchable format. The electronic ADP file data size limit shall be 60MB. ADP files larger than 60 MB shall be broken down into volumes (each not to exceed 60MB) along with a hard copy to match the electronic version's Table of Contents (TOC) and volume(s). An electronic and hard copy shall be included with each deliverable item shipment.

Delivery will not be accepted by the Government without an accompanying ADP. Each ADP shall be subject to approval. In the event of disapproval, the Contractor shall initiate immediate corrective action and shall resubmit for approval.

3.3 Certification of Intent to Build to Print (CDRL Item C2)

In lieu of providing shop drawings, the Contractor shall submit a Certification of Intent to Build to Print, indicating that all items will be fabricated per the drawings and specifications provided.

3.4 As-Built Drawings (CDRL Item C3)

The Contractor shall provide full-size as-built drawings with the ADP, reflecting any alterations and redlines made to the original engineering drawings provided by the Government. The Contractor shall indicate the official communication that drove each change on the as-built drawings.

3.5 Subcontractor Specifications (CDRL Item C4)

The Contractor shall provide the Contracting Officer with specifications that the Contractor intends to submit to any subcontractors for the Government to review prior to any subcontract work being performed.

3.6 Requests for Information (CDRL Item C5)

After contract award, the successful Contractor shall, when contract information or clarification is required by the Contractor, prepare and submit KSC Form 8-268, "Request for Information (RFI)/Clarification." The form shall be submitted to the Contracting Officer and will be returned to the contractor with the appropriate response within five working days. The Contractor shall indicate on the RFI if the concern or question has an effect on schedule or cost. The blank KSC Form 8-268 will be provided to the Contractor at the post award pre-work meeting.

3.7 Deviations and Waivers (CDRL Item C6)

The Contractor shall follow KDP-KSC-P-2388, Processing Contractor Request for Use of Nonconforming Supplies or Services, for any deviation or waiver for the use of nonconforming supplies or services. The Contractor shall use KSC Form 8-69 for all deviation or waiver requests. Deviation requests are to be submitted when the Contractor wishes to deviate from a requirement in this Statement of Work, drawings, specifications, or standards. Waiver requests are to be submitted when the Contractor is unable to meet a requirement in this Statement of Work, drawings, specifications, or standards, and is requesting relief from that requirement. The Contracting Officer shall hold final decision rights for the approval of deviation and waiver requests. The blank KSC Form 8-69 will be provided to the Contractor at the post award pre-work meeting.

3.8 Meeting Records (CDRL Item C7)

The Contractor shall schedule and conduct post-award pre-work and other Technical Interchange Meetings as required by the Government at the Government's required need time throughout the period of performance. The Contractor shall allow periodic visits to the Contractor's facilities for the purpose of in-process inspections and to convey additional information as required.

The Contractor shall be available for meetings as required by the Government. The Contractor shall provide meeting minutes to attendees five days after the meetings.

3.9 Progress Schedules (CDRL Item C8)

The Contractor shall provide a progress schedule to be updated monthly. The schedule shall include planned and actual completion dates of important tasks and milestones, and shall summarize any problems and potential schedule delays.

4. GOVERNMENT-FURNISHED PROPERTY PROVIDED FOR CONSUMPTION/INCORPORATION INTO FABRICATED END ITEMS

The Government-Furnished Property (GFP) identified in Appendix B is provided for consumption or incorporation into the fabricated end items deliverable under this contract. From the time of receipt until consumption or incorporation, GFP shall be managed in accordance with FAR 52.245-

1 and other pertinent terms and conditions of the base contract and the IDIQ Task Order. Any remaining GFP shall be returned with the last delivery of pipe assemblies.

4.1 GFP Requirement Notification (CDRL Item C9)

The Contractor shall give written notice to the Contracting Officer no later than 15 days prior to the need for GFP to be used in the fabrication of contracted/purchased equipment.

4.2 GFP Shortage and Damage Notification (CDRL Item C10)

The Contractor shall give written notice to the Contracting Officer of any GFP shortages and/or damaged items within five days after receipt of the shipment. The Contractor is responsible for the replacement value of any GFP items damaged during fabrication.

5. ACCEPTANCE TESTING (CDRL ITEMS C11, C12, C13, C14, C15)

The Contractor shall submit an acceptance test procedure to the Contracting Officer for approval 15 days prior to the test.

Prior to final acceptance, all punch list items shall be fully dispositioned, and a final walkdown with the NASA KSC Quality Assurance Representative (QAR) shall be conducted.

5.1 Hydrostatic Test

All fabricated pipe assemblies shall be hydrostatically tested as per each drawing's notes. The Contractor shall submit proper documentation of all hydrostatic testing. Test reports shall consist of the following (at a minimum):

- Date of Test
- Identification for tubing assembly tested (cross reference with drawing)
- Test Fluid
- Test pressure recorded at indicated time intervals with test fluid temperature
- Certification of calibration for all gauges used
- Certification of visual inspection and test results by the examiner (quality personnel/quality control stamps)

5.2 Leak Testing

Leak testing shall be as specified in each drawing.

6. FABRICATION

The Contractor shall provide all management, material, labor, facilities, tools, equipment, and transportation necessary to procure, fabricate, assemble, inspect, test, mark, package and deliver the line items specified in the purchase contract.

6.1 Structural Requirements

All fabrication shall be in accordance with the drawings listed in Appendix A.

6.2 Welding Requirements (CDRL Items C16, C17, C18, C19)

All welding, welding certifications, and welding inspections shall be the notes in the drawings.

6.3 Fluid Assembly Requirements

6.3.1 Tubing

6.3.1.1 Workmanship

N/A

6.3.1.2 Material

Pipe & other materials shall be per specified in the drawings.

6.3.1.3 Inspection (CDRL Item C20)

The Contractor shall perform inspections in compliance with the notes in the drawings.

6.3.2 Materials and Components (CDRL Items C21, C22)

The Contractor shall provide vendor data sheets (including warranty information) or, if applicable, KSC-controlled component specification drawings, for all materials and components. The Contractor shall also provide a Certification of Compliance (COC) for all materials and components to verify that traceability meets the required component specification requirements. The Government will provide all applicable documentation for GFP, which the Contractor shall include in the ADP.

The Contractor is responsible for obtaining certified calibration traceable to NIST standards on all pressure gauges, vacuum gauges, compound gauges, pressure transducers, vacuum transducers, compound transducers, flow meters, relief valves, and filters. The filter elements used for leak testing and functional testing shall be verified by performing a bubble point test per SAE ARP901, Bubble Point Test Method. The calibration laboratory shall meet the requirements of ANSI/NCSL Z540.3, including, but not limited to, Measurement Traceability, Uncertainty, Personnel Training, and Record Keeping.

6.3.3 Fittings

N/A

6.4 Electrical Requirements (CDRL Items C23, C24, C25)

N/A

7. PROTECTIVE COATING SYSTEM

The assemblies shall have the appropriate coating system applied as indicated on the engineering drawings. Quality control shall be performed by an independent National Association of Corrosion Engineers (NACE) certified coating inspector Level 3 provided by the Contractor. Preventive measures are required to protect coated surfaces during handling and transport. Painting shall be done after all fabrication and machining processes.

7.1 Approved Coatings

The coatings applied shall be as specified in NASA-STD-5008. The manufacturer's instructions for storage, handling, and application of coating materials shall be strictly followed.

7.2 Color Requirements

The finish coat color shall conform in gloss and hue to FED-STD-595 per the finish details provided on the engineering drawings.

7.3 NACE Inspector (CDRL Item C26)

n/a

7.4 NACE Inspection Record (CDRL Item C27)

n/a

8. CLEANING (CDRL ITEM C28)

The Contractor is responsible for the precision cleaning of all tubing and piping systems, including all components, fittings, gaskets, seals, etc., used in this contract. Components shall be disassembled, cleaned and reassembled in accordance with the notes in the drawings. The Contractor may use an alternate cleaning specification with prior approval of the Contracting Officer. The Contractor is also responsible for maintaining and preserving the cleanliness of all precision cleaned components and tubing in accordance with the surface cleanliness levels indicated on the engineering drawings.

All assembly and testing operations, unless otherwise specified, shall be performed in an environment conforming to ISO 14644 Class 8 to maintain the cleanliness level of the equipment

indicated on the drawing. Cleaning procedures, the results from testing each clean room or clean zone, and a statement of compliance with the specified cleanliness classification per the requirements in ISO 14644-1 shall be submitted at least 15 days prior to the start of cleaning.

9. QUALITY ASSURANCE

9.1 Inspection and Acceptance

The Contractor shall reference the following Inspection and Acceptance clauses by reference to the IDIQ contract from which this DO is awarded:

FAR 52.246-2	Inspection of Supplies – Fixed Price (Aug 1996)
FAR 52.246-16	Responsibility for Supplies (Apr 1984)
FAR 52.246-15	Certificate of Conformance (Apr 1984)

9.2 Inspection Control Point Outline (CDRL Item C29)

Prior to the start of work, the Contractor shall provide the NASA KSC Contracting Officer and Quality Assurance Representative (QAR) a schedule and Inspection Control Point Outline (ICPO) which shows the work sequence(s) to be employed during the performance of this Purchase Order. The contractor's schedule/ICPO must indicate what types of contractor inspections will be performed and where in the contract's sequence of events they will be accomplished. If applicable, the schedule/ICPO must also indicate the specification(s) (including revisions) and/or other documentation that will be used to perform the indicated inspections. Special inspections, called mandatory inspection points (MIP) for the contractor to perform, will be designated by the Government during the performance of this contract. Upon submittal of the ICPO, the Government will identify which inspections/tests/work steps require Government to witness. These inspections/tests and/or work steps will be designated as GMIPS. The contractor shall notify The NASA KSC QAR at least five (5) working days prior to the occurrence of a scheduled, designated GMIPS. Designation of GMIPS does not relieve the contractor of the obligation to perform all contractually required inspections.

9.2.1 Mandatory Inspection Points

Quality Assurance inspection shall be included in contractor procedures and ICPO, but not limited to the following tasks:

- Functional testing
- Leak check of assembled hardware
- Chemical cleaning
- Hydrostatic testing
- Coatings
- Final assembly

9.2.2 Government Mandatory Inspection Points

In addition to the Mandatory Inspection Points listed in Section 9.2.1, NASA Engineering inspection shall be included, but not limited to the following tasks:

- Integrated mechanical testing
- Functional testing
- Leak check of assembled hardware
- Pre-coating inspection of assembly

The Government reserves the right to perform inspections at any point in the fabrication process.

9.3 Notifications (CDRL Item C30)

The KSC Contracting Officer's representative (COR) and KSC QAR shall be notified of each scheduled MIP and GMIP no less than five working days prior to initiating the task.

9.4 As-Built Configuration List (CDRL Item C31)

The Contractor shall provide an As-Built Configuration List (ABCL) of all serial number or lot number controlled items installed for each end item, including items provided as GFP. The following information shall be included in each ABCL, as applicable:

- Reference designator/A-number
- Part number
- Part description
- Vendor name
- Vendor CAGE code
- Vendor serial number
- Vendor lot number
- Specification number (with revision level)

Hardware such as tubing, piping, nuts, bolts, shims, etc., are not required on the ABCL.

9.5 Certification of Dimensional Inspection (CDRL Item C32)

The Contractor shall provide certification with each shipment that all the articles were dimensionally inspected for conformance with drawing and Delivery Order requirements. All out-of-tolerance measurements shall be clearly identified on the records, and the disposition of that out-of-tolerance measurement noted by the Organization's quality assurance organization. This information shall be submitted to NASA for acceptance or rejection of the out-of-tolerance condition, within five days of identification of the out-of-tolerance condition. The management representative responsible for the Contractor's inspection activity will certify that with signer's title and date of signature indicated that all of the shipped parts were inspected to the criteria

specified. Inspection equipment (e.g., tools, gages) used during dimensional measurement shall have its identification numbering recorded and have the ability to recall the parts inspected with that particular inspection device in the event it is subsequently found to be out of tolerance.

9.6 Contamination Control

The Contractor's cleaning procedures shall include Quality Assurance provisions for in-process controls to prevent contamination, including provisions for maintaining cleanliness of on-site, pre-packaged components, and sub-assemblies. The Contractor shall double package all precision cleaned components per ISO 14592.

9.7 Component Traceability

Cleanliness certifications, hydrostatic and leak test results, and material certifications must be traceable to each item or component with a unique identifier (commonly referred to as A-Numbers or Find Numbers) and/or serial number. Copies of test results, certifications, and component data sheets shall be included in the ADP for each unique component.

9.8 Additional Aerospace Quality Clauses

The Aerospace Quality clauses have been derived from AS9100 requirements. The Contractor should already be in compliance with AS9100 upon contract award and shall comply with the following clauses of this SOW.

9.8.1 AQC04 Flow Down Requirements

This clause mandates that all applicable requirements that are invoked or applied to the customer's purchasing document, including this clause, shall be flowed down to the Contractor's sub-tier suppliers.

9.8.2 AQC06 Certificate of Compliance – Raw Materials

The following clause applies when the Contractor will purchase (not including Government Furnished Property) raw materials to defined specification(s).

The Contractor will include with each shipment the raw material manufacturer's test report (e.g., mill test report) that states that the lot of material furnished has been tested, inspected, and found to be in compliance with the applicable material specifications. The test report will list the specifications, including revision numbers or letters, to which the material has been tested and/or inspected and the identification of the material lot to which it applies.

When the material specification requires quantitative limits for chemical, mechanical, or physical properties, the test report will contain the actual test and/or inspection values obtained. For aluminum mill products (except castings), certifications for chemistry may indicate compliance within the allowed range. Certifications for physical properties will show actual values.

When contractor supplies converted material produced by a raw material manufacturer, the contractor shall submit all pre and post conversion chemical/physical tests reports.

9.8.3 AQC08 Special Process Certification

Certain special processes are required to comply with this contract. Special processes shall be performed only by sources that have been surveyed and qualified/approved, by the supplier and/or the Customer, to perform those processes. The contractor shall provide to the Customer upon request all documentation showing evidence of special processor qualification and/or certification to perform special manufacturing, assembling, and test processing as required by the contract. The Contractor may elect to use only Customer approved sources.

A special process certification shall be provided with each shipment of item(s) delivered on this contract. Special Process Certifications may be in supplier format and shall include the following:

- Customer's Order number
- Part number(s)
- Serial and/or lot numbers, of the hardware processed (if applicable)
- Material process specification & revision
- Objective evidence demonstrating compliance with the applicable process, (e.g., temperature charts and hardness test results for heat treatment, destructive test results, etc.)
- A certification stating the special process was performed per the applicable drawing/specification requirements.
- Organization's name and address

When special processor is other than the Organization, provide a certification of compliance from the special processor stating the special process was performed per the applicable drawing/specification requirements. Certifications must include the processor's name, address and be signed and dated by a company official.

Each certification must be signed and dated by a company official of the Organization and/or Processor attesting to the acceptance of the processes performed to the required specification(s).

The supplier shall retain all records associated with the selection and approval of supplier approved special process providers. Per contract or regulatory agency requirements, these records shall be made available to the Customer and/or regulatory agencies upon request. The supplier shall notify the Customer prior to destruction of records relative to this contract.

The Contractor shall insert the substance of this clause, including this sentence, in all lower-tier subcontracts for work performed under this contract.

The special processes involved with this Delivery Order are tube flaring, tube bending, and welding (where applicable to specification).

9.8.4 AQC16 Nondestructive Inspection/Nondestructive Test Certification

The Contractor will include with each shipment a certificate for the nondestructive inspection (NDI)/nondestructive test (NDT) performed. As a minimum, the certification shall contain the following information:

- Customer's Purchase Order / Contract number
- Name and address of the Company performing NDI/NDT;
- Date of Inspection;
- Quantity of parts tested by part number;
- Specification or other requirement defining the NDI/NDT acceptance / rejection criteria;
- Inspector/name/stamp and NDI/NDT certification level;
- NDI/NDT specification including revision;
- Material or item identification (part number, heat lot number, Foundry Record (FR) number;
- Material or item traceability (serial number, lot number, batch number, lot/date code);
- Inspection results (accept/reject);
- Reference to previous NDI/NDT reports for repair/rework if applicable;
- Reference to attached recordings i.e., films or photographs if applicable.

These records shall include all information required in the previous paragraph as well as acceptance / rejection criteria, and related test instrument data used in the NDI/NDT process.

9.8.5 AQC17 100% Attribute Clause

The Contractor is responsible for the performance, on a one hundred percent (100%) basis of all inspections and tests and record requirements specified in the contract. Unless otherwise specified in the contract, the Contractor may utilize independent inspection and testing laboratories or services that are acceptable to the Government.

10. PREPARATION FOR DELIVERY

The Contractor shall comply with the packaging, handling and transportation instructions identified in KSC-STD-Z-0005 and ISO 14952. Each capped connection shall be bagged in accordance with ISO 14952 and secured with an integrity seal such that any attempt to remove the bag would be indicated by a broken seal. The table below indicates acceptable bagging materials for different fluid service.

Plastic Film	Thickness Range (μm)	Use
Polyethylene in accordance with A-A-3174	137 to 168 (5.4 to 6.6 mil)	Overwrap, except may be used for inner wrap of items cleaned to level VC

Nylon 6 or equivalent polyamide	43 to 58 (1.7 to 2.3 mil)	Precision packaging, not for liquid and gaseous oxygen and hypergol service
Aclar 22A per SAE-AMS-3649	38 to 76 (1.5 to 3.0 mil)	Precision packaging, suitable for liquid and gaseous oxygen and hypergol service
Teflon FEP or equivalent polyfluorotheylenepropylene in accordance with SAE-AMS-3647	13 to 508 (0.5 to 20 mil)	Precision packaging, suitable for liquid and gaseous oxygen and hypergol service

10.1 Advance Shipping Notice (CDRL Item C33)

An Advanced Shipping Notice is a courtesy letter or fax which provides advance shipping information to the Contracting Officer to coordinate the receipt of the shipped items with the NASA receiving, transportation, and management personnel. An Advanced Shipping Notice shall be provided no less than 10 days prior to each shipment. The Contractor shall furnish the following written information to the Contracting Officer: date of shipment, method of shipment, complete or partial shipment, number of cartons, total weight, dimensions.

10.2 Shipping Documentation (CDRL Item C34)

A label shall be located on the panel to indicate the panel is under pressure. Completed assemblies are to be weighed before shipment and the weight recorded within the shipping documents. Pictures of the final assembly ready for shipment shall be taken and included in the ADP.

10.3 Material Inspection Receiving Report (CDRL Item C35)

All items shall be accompanied with Form DD250, "Material Inspection Receiving Report." Final acceptance shall be at the NASA destination. The Contractor shall record the blanket pressure on Form DD250 prior to shipment and provide a method for NASA to verify the pressure upon delivery.

10.4 Transportation

The Contractor is responsible for all fixtures, tie-downs and supports, and any applicable permits required for shipping.

The point of acceptance will be Kennedy Space Center. Unless otherwise directed, the Contractor will ship all parts to:

Transportation Officer, NASA
ISC Warehouse Building, M6-0744
Kennedy Space Center, FL 32899

11. SPECIAL CONDITIONS

N/A

APPENDIX A. DRAWING LIST

Engineering Drawings

Document Number	Revision	Title
K0000094324	-	Flex Hose
K0000094325	-	Flex Hose
K0000081554	-	Flex Hose, 2nps
K0000081556	-	Flex Hose, 2nps
K0000081557	-	Flex Hose, 4nps
K0000081560	-	Flex Hose, 4nps

Component Specification Drawings

Document Number	Revision	Title
n/a	n/a	n/a

APPENDIX B. GOVERNMENT-FURNISHED PROPERTY LIST

Note: Government-Furnished Property that is serialized shall be identified and tracked by the Contractor upon receipt from the Government (e.g., cable assemblies, valves, transducers flow-meters, transmitters, regulators, gages, hoses, pumps, etc.).

Not applicable

APPENDIX C. CONTRACT DATA REQUIREMENTS LIST

Item	Section	Description	Date(s) Required
C1	3.2	Acceptance Data Package	Electronic copy and hard copy with delivery of hardware
C2	3.3	Certification of Intent to Build to Print	30 days after effective date of order and with ADP
C3	3.4	As-Built Drawings	With ADP
C4	3.5	Subcontractor Specifications	10 days prior to start of subcontract work
C5	3.6	Request for Information	As needed and full set with ADP
C6	3.7	Deviation or Waiver Request	As needed and with ADP
C7	3.8	Meeting Records	5 days after each meeting
C8	3.9	Progress Schedules	Monthly
C9	4.1	GFP Requirement Notification	15 days prior to Contractor need
C10	4.2	GFP Shortage and Damage Notification	If required, 5 days after receipt of GFP
C11	5.0	Acceptance Test Procedure	15 days prior to test
C12	5.0	Acceptance Test Notification	7 days prior to test
C13	5.0	Acceptance Test Record	5 days after test and with ADP
C14	5.0	Field Discrepancy Reports	As needed and with ADP
C15	5.0	Punch List with Disposition	With ADP
C16	6.2	Certification of Welders	30 days after effective date of order and with ADP
C17	6.2	Welding Procedure	15 days prior to welding
C18	6.2	Certification of Weld Inspector	15 days after effective date of order and with ADP
C19	6.2	Weld Inspection Record	5 days after weld inspection completion and with ADP
C20	6.3.1.3	n/a	n/a
C21	6.3.2	Vendor Data	With ADP
C22	6.3.2	Certificate of Compliance	With ADP
C23	6.4	n/a	n/a

Item	Section	Description	Date(s) Required
C24	6.4	n/a	n/a
C25	6.4	n/a	n/a
C26	7.3	n/a	n/a
C27	7.4	n/a	n/a
C28	8.0	Cleaning Procedure and Record	15 days prior to cleaning and with ADP
C29	9.2	Inspection Control Point Outline	30 days after effective date of order
C30	9.3	Mandatory Inspection Point Notification	5 days prior to each MIP/GMIP
C31	9.4	As-Built Configuration List	With ADP
C32	9.5	Certification of Dimensional Inspection	With ADP
C33	10.1	Advanced Shipping Notice	5 days prior to shipment
C34	10.2	Shipping Documentation/Pictures	With ADP
C35	10.3	Material Inspection Receiving Report	With shipment